Speculations about Block 268

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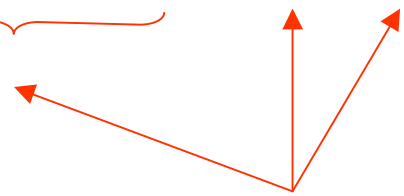
- Block 268 in this particular event seems to have an energy deposition of 52 GeV.

- From the physics point of view, given the fact that the Molliere radius $R_M = 7A/Z = 14$ gr/cm^2 = 14/4 cm = 3.5 cm, the 95% of the electromagnetic shower should be contained in $2R_M \sim 7$ cm. (block size is 15 x 15 cm^2), so it is conceivable for an EM shower to be fully contained in one block.

$$E_e = \sum_i E_{e_i} = \frac{e_i}{(<\mu>/<led>)_i * led_i} * \frac{1}{k_i}$$



Where block number that belongs to the EMCAL cluster of the electromagnetic shower (if there is one) of that particular particle.

= the deposited energy (in GeV) of the particle

= the deposited energy (in GeV) of the particle in block i

the particle response (in ADC counts) in block i

the mu/led ratio for block i

the led response (in ADC counts) in block i

the e/μ constant for that particular kind of block

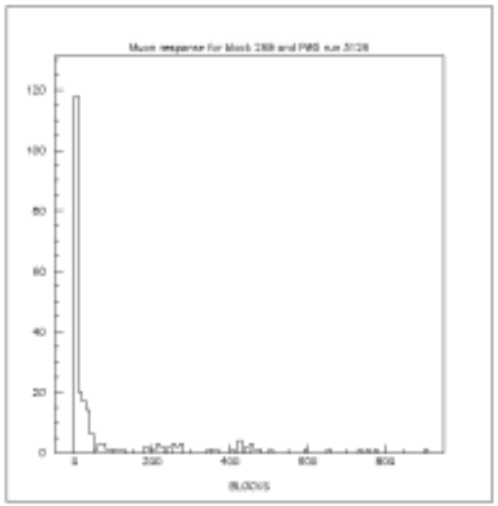
- the e/μ constant for that particular kind of block measured at the BNL test for blocks 294 293 292 (of the same kind) and found to be 1.54 ± 0.03, 1.54 ± 0.02, 1.44 ± 0.02 respectively with a mean value of 1.51.

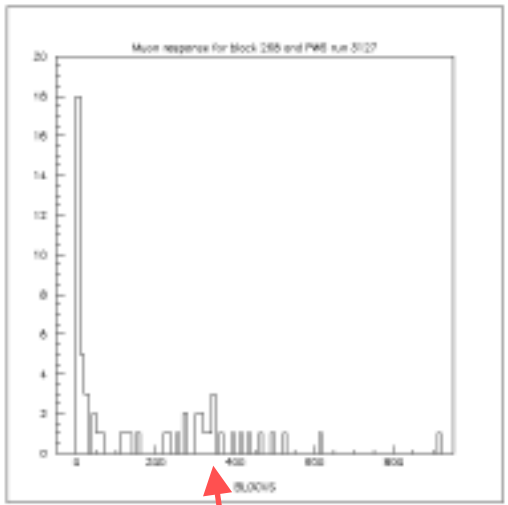
- the mu/led ratio for that particular block measured from the PW5 runs and the led response.

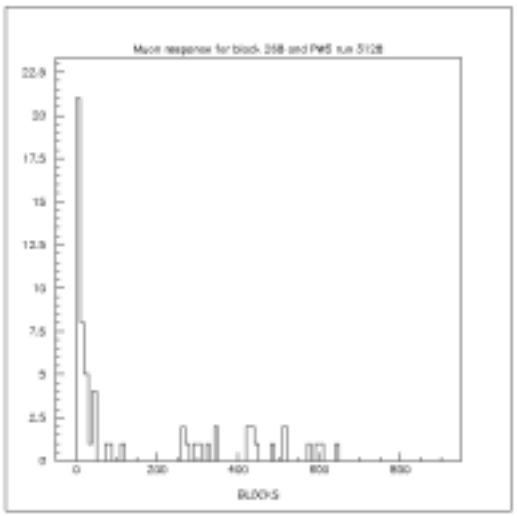
- the led response (in ADC counts) for that block measured for all data runs and all events.

- Since the k constant is the same for all blocks of this kind, and no strange behavior of other such blocks has been observed we decided to study the other two calibration constants

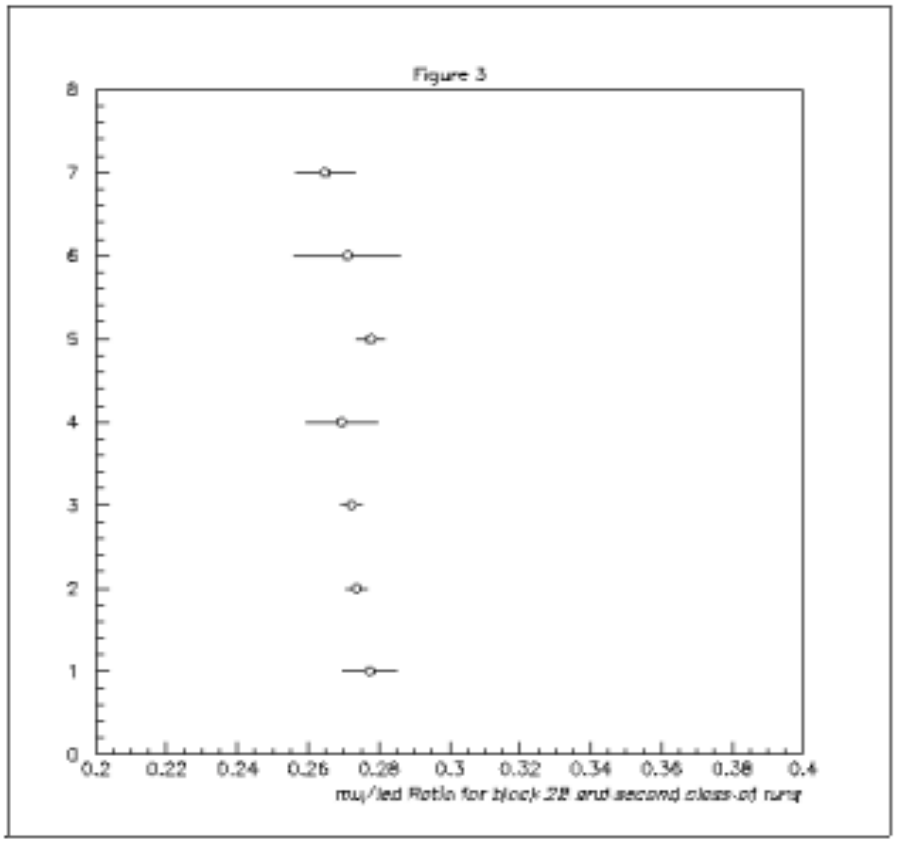
Muon response for Block 268 in Calibration Runs 3126 3127 3128







- We extracted the position of the muon peak for run 3127 only, were the distribution (although not to clear) can be fitted with a Landau to give a mean value of 305 ADC counts. This is consistent with runs 3126 and 3128 (see above histogram)
- Therefore only one measurement of the ratio can be performed for this block.



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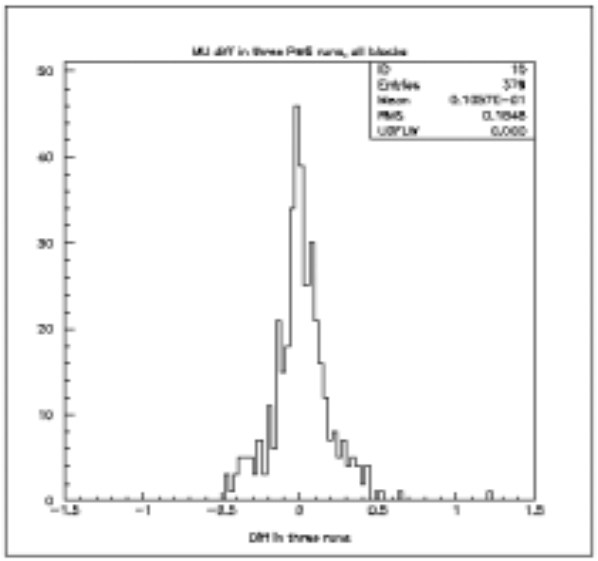
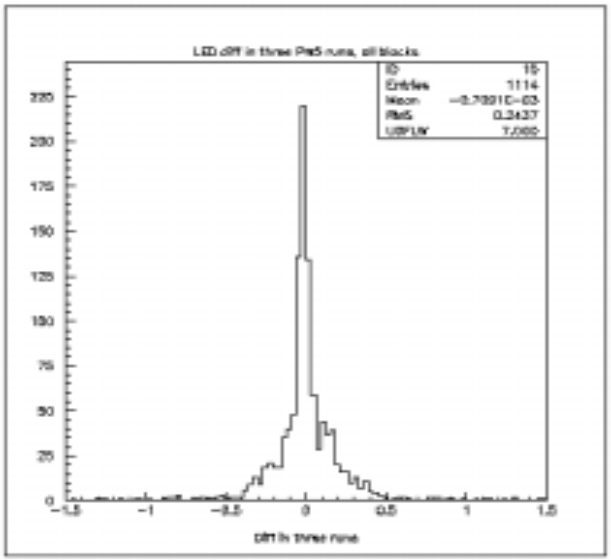
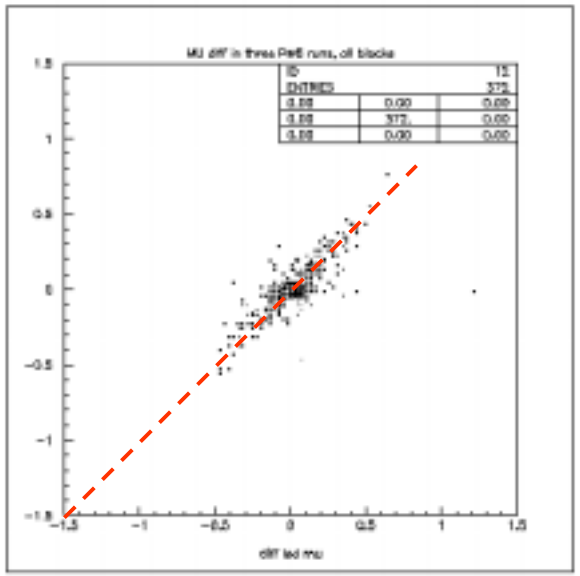
  - The ratio remains the for every block ,although the ADC channel that the appears for this block







Δ Δ Δ Δ

- We see that the position of the muon peak changes by maximum
- The same is also true for the LED
- The muon changes and the LED change follow each other (<μ>/<LED> unchanged)

- The behavior of the LED for that particular block is “strange”
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- The led fluctuates by a factor of 6700/670 = 10, which is not normal.
- The muon peak in all blocks for PW5 runs around 3253 does not change more that 50 % as shown in the histogram
- The <μ>/<led> ratio has been extracted from PW5 run 3127 to be ~ 0.05 with the <led>=6700 ADC counts and the muon peak <μ> =305 ADC counts. This value is very low, given the fact that <μ>/<led> values range between 0.17 - 0.90
- Therefore we cannot completely trust this block.
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- We checked the <μ>/<LED> ratios for all blocks. There are 14 blocks that may have problems. Most of the them have only on measurement of the <μ>/<LED> ratio in class 1 and one in class 2 that look ok.

- The following blocks should be watched in the analysis:
  - 268 Main suspect
  - 76, 119, 267, 293, 298, 322